

**39.2 Example of a Radiation Exposure System: Planning Verification Report
(Tennessee Valley Authority)**

REXPR303 T E N N E S S E E V A L L E Y A U T H O R I T Y PAGE:
 RUN DATE: 06-02-92 SQN RADIATION EXPOSURE SYSTEM
 RUN TIME: 14:51:55

PLANNING VERIFICATION REPORT

STATUS: COMPLETE

PLANNING REPORT NUMBER: 920026
 PLANNER: STAMEY HOOPER
 ORIGINATING SECTION: NUCLEAR STEAM SUPPLY/STEAM GENERATOR GROUP

	BEGIN	END
ESTIMATE	03/28/92	04/22/92
ACTUAL	03/30/92	04/19/92
-- LAST UPDATED --		
DATE	TIME	ID
05/27/92	11:37	IDQAI

JOB LOCATION: UNIT 2 STEAM GENERATOR (PLATFORM AND LAYDOWN AREAS)
 JOB DESCRIPTION: NOZZLE DAM INSTALLATION AND REMOVAL - INCLUDES ALL
 ACTIVITIES ASSOCIATED WITH CONTROLLING ENTRY OF FOREIGN MAT.
 THE REACTOR COOLANT SYSTEM, AND LEAKAGE FROM THE NOZZLE DAM
 - - - FULL JUMP AND HALF JUMPS ARE ANTICIPATED - -
 -- LAST UPDATED --

CRAFT	CRAFT TITLE	ESTIMATE	DATE	TIME	ID
ENGR	ENGINEER		03/02/92	10:24	IDQAI
	NUMBER OF PEOPLE	25			
	RWP HOURS	100			
	WB MREM	14000			
	WB RATE	140			

JOB REMARKS:
 GENERAL REQUIREMENTS

1. THE PROCEDURES FOR PERFORMING THIS ACTIVITY ARE INCLUDED AS PART OF WORK REQUESTS C049261 THROUGH C049264.
2. THIS ALARA PLANNING REPORT (APR) WAS PREPARED AFTER REVIEWING RCI-10 ATTACHMENT 2, "ALARA PLANNING CHECKLIST" AND ANY PREVIOUS APRS FOR SIMILAR WORK. THOSE ITEMS DIRECTLY APPLICABLE INCLUDING LESSONS LEARNED HAVE BEEN INCORPORATED.
3. THE WORK DIRECTOR SHALL PROVIDE AN AUTHORIZED USERS LIST TO RADCON OF THOSE INDIVIDUALS APPROVED FOR ENTRY ON THE ASSOCIATED RWPS. THOSE INDIVIDUALS SHOULD BE THE MOST EXPERIENCED AND WITH THE LEAST EXPOSURE. THE WORK DIRECTOR SHALL ENSURE THESE WORKERS HAVE BEEN BRIEFED ON THE JOB SCOPE INCLUDING SPECIFIC ACTIVITIES, RADIOLOGICAL CONDITIONS AND THE RADIOLOGICAL REQUIREMENTS CONTAINED BOTH IN THE APR AND RWP.
4. ALL WORKERS WILL BE INFORMED THAT WORK SHALL STOP IF INDIVIDUALS FEEL THAT RADIOLOGICAL OR PERSONNEL SAFETY IS BEING JEOPARDIZED OR IF PROBLEMS ARISE NOT PREVIOUSLY ANTICIPATED. WORKERS WILL EXIT THE WORK AREA OR REPORT TO THE NEAREST LOW DOSE WAITING AREA

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(POSTED WITH BLUE AND WHITE SIGN STATING "ALARA ZONE")

PREREQUISITES

1. THE PRIMARY PLATFORM SHALL BE CLEARED OF ALL MANWAY REMOVAL EQUIPMENT BEFORE NOZZLE DAM STAGING AND INSTALLATION CAN BEGIN. THE MANWAY REMOVAL EQUIPMENT MAY BE STORED IN A LOW TRAFFIC AREA OF THE LAYDOWN AREA AGREED UPON BY THE STEAM GENERATOR GROUP, WESTINGHOUSE AND RADCON.
2. CHANNELHEAD RADIATION SURVEYS (ION CHAMBER TYPE) SHALL BE COMPLETE PRIOR TO ENTRY BY PERSONNEL FOR DAM INSTALLATION.
3. THE MANWAY REMOVAL EQUIPMENT SHALL BE REMOVED FROM THE PLATFORM PRIOR TO NOZZLE DAM INSTALLATION.
4. PRESENCE OF SHOT IN THE BOWL SHALL REQUIRE ADDITIONAL VACUUMING PRIOR TO NOZZLE DAM REMOVAL. ALL SHOT PEENING MATERIAL MUST BE REMOVED FROM THE BOWL BEFORE BREACHING THE PRIMARY SYSTEM.

SPECIAL REQUIREMENTS

1. BECAUSE OF THE SPECIAL RADIOLOGICAL CONDITIONS ASSOCIATED WITH STEAM GENERATOR MAINTENANCE, SPECIAL PRECAUTIONS MUST BE EXERCISED BY EACH WORKER. THESE PRECAUTIONS ARE SPECIFIED IN APR 920025 AND ARE CONSIDERED AN INTEGRAL PART OF ALL STEAM GENERATOR MAINTENANCE ACTIVITIES.
2. THIS PLANNING REPORT DEALS SPECIFICALLY WITH THE INSTALLATION AND REMOVAL OF NOZZLE DAMS. NOZZLE DAMS ARE TO BE INSTALLED IN LOOPS 1, 2, 3, AND 4 STEAM GENERATORS. THESE DEVICES ARE TO BE INSTALLED MANUALLY (I.E., FULL JUMPS WILL BE REQUIRED).
3. THE INSTALLATION AND REMOVAL PROCESSES SHALL BE PERFORMED BY QUALIFIED INDIVIDUALS. PERSONNEL PERFORMING THE INSTALLATION SHALL MINIMIZE THE TIME SPENT IN FRONT OF THE OPEN MANWAY. DURATION AND FREQUENCY SHALL BE CONTROLLED BY THE RADCON TECHNICIAN PROVIDING COVERAGE.
4. INDIVIDUAL REMAINING ALLOWABLE DOSES (RAD) FOR PERSONNEL WHO MAY BE REQUIRED TO ENTER THE PRIMARY BOWL WILL BE CHECKED PRIOR TO EACH ENTRY INTO THE LAYDOWN AREA. ANY RWP ENTRY BY AN INDIVIDUAL WITH A RAD OF LESS THAN 900 MREM MUST BE APPROVED BY A RADCON SHIFT SUPERVISOR. ANY ENTRY BY AN INDIVIDUAL WITH A RAD OF LESS THAN 200 MREM MUST BE APPROVED BY THE RADCON FIELD OPERATIONS MANAGER. ANY ENTRY BY AN INDIVIDUAL WITH A RAD OF LESS THAN 100 MREM MUST BE APPROVED BY THE RADCON SUPERINTENDENT INDIVIDUALS WITH LESS THAN 50 MREM REMAINING SHALL NOT BE ALLOWED TO ENTER. ALL APPROVALS AS REQUIRED IN THIS SECTION

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MUST BE DOCUMENTED IN THE S/G CONTROL POINT LOGBOOK.

5. THE PROCESSING OF TLDS SHALL BE PERFORMED AS EXPEDITIOUSLY AS POSSIBLE. IF DURING AN ENTRY AN INDIVIDUAL RECEIVES MORE THAN 50% OF THEIR RAD, THE INDIVIDUAL WILL NOT BE ALLOWED REENTRY UNTIL HIS TLD RESULTS ARE OBTAINED.

PRECAUTIONS

1. THE NOZZLE DAM EQUIPMENT MUST BE KEPT NEAT AND ORDERLY DURING THE INSTALLATION AND REMOVAL PROCESSES.
2. ALL EQUIPMENT REMOVED FROM THE GENERATOR SHALL BE SUBJECTED TO A HOT PARTICLE CHECK FOLLOWING TASK COMPLETION. IT IS RECOMMENDED THAT THE NUMBER OF PARTICLE CHECKS BE LIMITED SUCH THAT WORK PROGRESS WILL NOT BE ADVERSELY IMPACTED. HIGH CONTAMINATION LEVELS ARE EXPECTED ON THE NOZZLE DAMS, THEREFORE THEY SHALL BE WIPED DOWN WITH DAMP RAGS IMMEDIATELY AFTER REMOVAL FROM THE STEAM GENERATOR, GENTLY LOWERED FROM THE PLATFORM TO THE LAYDOWN AREA AND BAGGED UP FOR REMOVAL FROM THE ZONE. A HOT PARTICLE SURVEY WILL BE PERFORMED ON THE OUTER BAGGING OF THE NOZZLE DAMS PRIOR TO REMOVAL FROM THE LAYDOWN AREA.
3. FOLLOWING NOZZLE DAM INSTALLATION, AND NOZZLE DAM REMOVAL, THE PRIMARY PLATFORM SHALL BE SURVEYED AND CLEANED TO CONTROL CONTAMINATION. REMOVAL OF A HERCULITE/OIL CLOTH LAYER IS AN ACCEPTABLE METHOD OF CLEANUP.
4. THE NOZZLE DAMS SHALL BE COVERED TO REDUCE THE PROBABILITY OF LOOSE SHOT BECOMING TRAPPED IN NOZZLE DAM CREVICES AND RELEASED DURING THE REMOVAL PROCESS.
5. A LEAK DETECTION DEVICE SHALL BE PLACED IN EACH CHANNEL HEAD TO DETECT ANY FAILURES OF THE NOZZLE DAMS. THE DETECTION UNIT SHOULD ACTUATE A PUMP TO REMOVE ANY WATER ACCUMULATIONS. THE PUMP MUST DISCHARGE TO A FUNCTIONAL FLOOR DRAIN.

POST JOB REMARKS:

25% REVIEW

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3/31/92 0430

NOZZLE DAM INSTALLATION COMPLETED ON 3/30/92 @1100. ACTUAL EXPOSURE WAS 6.0 MAN-REM (TLD) OR 43% OF ESTIMATE. POST JOB REVIEW WITH WORK DIRECTOR AND RADCON TECHS REVEALED NO PROBLEMS WITH ENTIRE ACTIVITY. ONE ENHANCEMENT MENTIONED WAS THAT THE TLD SHOULD BE CHECKED TO MAKE SURE IT IS OPERABLE AND VERIFY ALL TLD'S ARE ATTACHED. ALSO THE FO PROCEDURE SHOULD BE REVISED TO SHOW THE METHODOLOGY USED TO DETERMINE BETA ATTENUATION. A LOTUS SPREADSHEET WAS MADE TO RECORD THE NEEDED

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DATA FROM TLD AND SURVEY RESULTS. HAVING THAT AVAILABLE EXPEDITED THE ANALYSIS NEEDED FOR CALCULATING STAYTIMES AND EVALUATING THE NEED FOR EXTRA PROTECTION FOR THE LENS OF THE EYES.

NOTE: THE JUMPERS WORE AN ELECTRONIC DOSIMETER (ED) ON THEIR CHEST AND THIS NUMBER WAS USED TO SIGN OUT ON REX. THE RESULTS OF THE TLD MULTIPLE BADGING INDICATE THE HIGHEST RECEPTOR WAS THE HEAD FOR 6 OF 8 JUMPERS A DIFFERENCE OF 30-50% BETWEEN THE TWO, WITH THE CHEST LOWER, MEANT THAT REX SHOWED EXPOSURES OF 4500 MR WHILE THE TLD BADGES TOTALED 6000 MR. THE CHEST ED READ WITHIN 11% OF THE TLD BADGE FOR THE SAME LOCATION. THIS MEANS THAT IF THE ED IS NOT PLACED WITH THE EXPECTED HIGHEST RECEPTOR AND THEN USED TO SIGN OUT ON REX JOB EXPOSURE WILL BE UNDER REPORTED ON REX BY 30-50%.

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50% REVIEW POST JOB REVIEW

NOZZLE DAMS WERE REMOVED ON 4/19/92 WITH NO PROBLEMS ENCOUNTERED. THE WORK DIRECTOR AND RADCON TECHNICIANS EXPRESSED NO CONCERNS WITH THE REMOVAL PERFORMANCE. A POST JOB REVIEW WAS COMPLETED WITH THE WORK DIRECTOR ON 4/21/92. THE FOLLOWING ARE DOSE PERFORMANCE RESULTS BASED ON REX AND INDIVIDUAL TLD BADGE READS:

	REX	TLD
INSTALLATION	4560	5825
REMOVAL	2348	2279
=====		
TOTAL	6908 MANREM	8104 MANREM

OBSERVATIONS:

THE EXPOSURE TOTALS HAVE CHANGED SINCE THE 50 % POST JOB REVIEW. THE CHANGES ARE INSIGNIFICANT FROM OVERALL PERFORMANCE OF THE TASK AND LESSONS TO BE LEARNED. HOWEVER, IT IS IMPORTANT TO NOTE THAT SUBTLE CHANGES CAN OCCUR WITHIN THE REXS DATABASE BASED ON DATA CORRECTIONS, DELETIONS OR ADDITIONS BY PERSONNEL AUTHORIZED ACCESS TO THAT PORTION OF THE DATABASE. THE DATABASE DOES MAINTAIN AN AUDIT TRAIL FOR DATA CHANGES AND CAN BE REVIEWED TO DETERMINE THE REASON FOR THE CHANGE BUT IS SOLELY DEPENDENT UPON THE DESCRIPTION PROVIDED BY THE PERSON EFFECTING THE CHANGE.

THE EXPOSURE TOTAL AS RECORDED ON THE RWP PORTION OF REXS GIVES AN INCORRECT ACCOUNTING OF THE EXPOSURE COST FOR INSTALLING AND REMOVING NOZZLE DAMS. THE RECORDING OF EXPOSURE IS THE RESPONSIBILITY OF THE INDIVIDUAL PRIOR TO AND IMMEDIATELY FOLLOWING THE ZONE ENTRY. THE PERSONNEL PERFORMING NOZZLE DAM INSTALLATION AND REMOVAL ARE VOLUNTEERS. PAST EXPERIENCE WITH NOZZLE DAM ACTIVITIES USING THE VOLUNTEER PROGRAM SHOWS THAT SOME OF THE INDIVIDUALS HAVE FAILED TO PROPERLY

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USE THE REXS SYSTEM. THE FAILURE HAS RESULTED IN REXS DATA ERRORS WHICH REQUIRE CORRECTION. BECAUSE THE VOLUNTEER TEAM HAS ALWAYS BEEN ASSISTED BY EXPERIENCED RADWORKERS, PERSONAL SAFETY (RADIOLOGICAL) HAS NOT BEEN COMPROMISED BY THE USE OF A VOLUNTEER CREW. IT IS VERY IMPORTANT THAT THE PERSONALIZED ATTENTION GIVEN TO THESE INDIVIDUALS NEEDS TO CONTINUE WITH INCREASED EMPHASIS ON COMPUTER (REXS) USAGE.

AS STATED EARLIER THE PLACEMENT OF THE ED IS CRITICAL FOR MEASURING THE HIGHEST EXPOSURE POINT FOR THE INDIVIDUAL. THE GREATEST EXPOSURE DIFFERENCE BETWEEN THE ED (CHEST) AND THE HIGHEST TLD RECEPTOR (HEAD) WAS 26 PERCENT. FOR EXAMPLE, THE EXPOSURE (ED) RECORDED FOR ONE RWP ENTRY WAS 687 MR AS EXPECTED. FOR THE SAME ENTRY, THE TLD BADGES WERE READ AND THE HEAD BADGE VALUE WAS 919 MREM WHICH COULD BE CONSIDERED AS SIGNIFICANTLY HIGHER. FORTUNATELY, THIS IS NOT A CASE OF THE ED FAILING TO RESPOND PROPERLY. THE ED REPOSE WAS SUBSTANTIATED BY COMPARISON TO THE CHEST TLD VALUE (677 MREM) TO THE ED VALUE (687 MR). THE LESSON TO BE LEARNED IS THAT FOR HIGH DOSE FIELDS OR FOR EXPECTED HIGH ACCUMULATE EXPOSURE TASK, CONSCIOUS DECISIONS FOR ALLOWING REENTRY INTO HIGH DOSE RATE AREAS MUST BE MADE BY THE RADCON STAFF. BASED ON AVAILABLE DATA AND EXPECTATIONS, REENTRY SHOULD BE CONTINGENT UPON TLD RESULTS. ANOTHER DATA POINT WHICH WAS AVAILABLE FOR THIS WORK WAS THE EXPOSURE INFORMATION FROM THE SACRIFICIAL DOSIMETRY PLACED ON THE OUTSIDE OF THE BUBBLE HOOD. THE SACRIFICIAL DOSIMETRY TYPICALLY PROVIDED MORE CONSERVATIVE ESTIMATES OF THE TLD DATA (I.E., GREATER THAN THE TLD).

THE RECORDED ED VALUES FOR THOSE INDIVIDUALS WHO CORRECTLY SIGNED IN AND OUT OF REX TOTAL TO 6.430 MAN-REM. IF THE ED READING FOR THE ONE PERSON WHO FAILED TO PROPERLY SIGN OUT IS INCLUDED, THE CUMULATIVE EXPOSURE IS 6.936 MAN-REM AS MEASURED BY THE ELECTRONIC DOSIMETRY. IN COMPARISON, THE TLD RESULT TOTAL (HIGHEST WHOLE BODY RECEPTOR) WAS 8.118 MAN-REM.

	NAME	DATE	TIME
PREPARED BY:	STAMEY, JAMES D	02/27/92	07:34
APPROVED BY:	SMITH, JAMES E	03/18/92	13:41
APPROVED BY:			
FINAL APPROVAL BY:	STAMEY, JAMES D	03/18/92	13:41